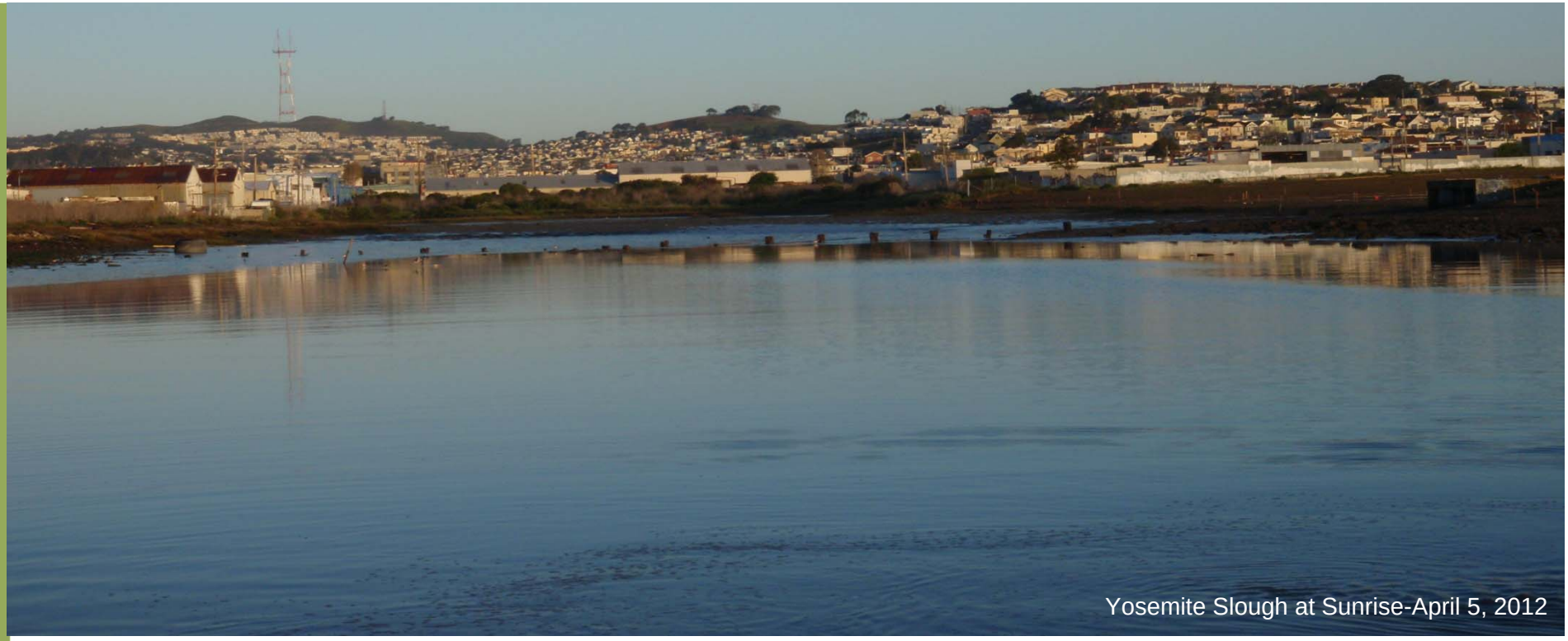


Yosemite Slough at Sunrise-April 5, 2012

Sediment Treatability Study
Yosemite Slough Site
Technical Stakeholder Meeting
San Francisco, CA

Draft July 24, 2012

NEWFIELDS

Study Objectives

- Quantify physical variations in sediments across the Slough
- Quantify potential chemical concentrations in surface water
- Quantity chemical concentrations in sediment-water effluent following chemical addition and physical manipulation
- Evaluate the efficiency of physical and chemical dewatering techniques

Project Tasks

- 4 Bulk Homogenized Sediment Samples
  - TS-038, TS-040, TS-041, TS-043
- 1 Bulk Homogenized Surface Water Sample
- Lab analysis of homogenized sediment samples
- DRET test of sediment slurry
- Jar tests of sediment slurry
- Geotube screening testing
- Geotube large volume testing
- Filter press testing
- Report of Findings

Current Status

- Field sampling completed
- Laboratory manipulations completed
- Bench testing completed
- Treatability pilot tests completed
- Laboratory QA/QC review is ongoing
- Final report will be issued following QA/QC review
- Presentation and data tables shall be considered draft for discussion only

Treatability Sample Locations

0 180 360 720 Feet

1 inch = 450 feet

Legend

- Sediment Treatability Samples
- Preliminary US EPA Yosemite Site Boundary

Note:

1. Preliminary Site Boundary based on US EPA contractor; Ecology and Environment, Inc. in Waste Characterization Study, Sampling and Analysis Plan.
2. Treatability samples were obtained within close proximity to the Waste Characterization samples with similar identification numbers.

NEWFIELDS

Figure 3

Treatability Sample Locations

Sediment Treatability Study
Yosemite Slough Sediment Site
San Francisco Bay, San Francisco, CA

Physical Characteristics and General Chemistry Analysis

Analytical Parameter	Unit of Measure	TS-038 Sediment (JB3719)	TS-040 Sediment (JB3719)	TS-041 Sediment (JB3563)	TS-043 Sediment (JB3563)
Sand- Fine, Medium and Coarse	%	**34.22**	**62.56**	**15.72**	**2.66**
Silt and Clay	%	**45.45**	**24**	**63.88**	**64.24**
Clay Colloids	%	**19.8**	**12.8**	**20.4**	**33.1**
Liquid Limit	%	**64**	**36**	**69**	**77**
Plastic Limit	%	**32**	**21**	**42**	**42**
Water Content	%	**50.6**	**39.9**	**54.6**	**56.7**
Total Organic Carbon	mg/kg	**16700**	**8770**	**23100**	**10900**
General description		Silty sand material with high water content and easily worked to plastic consistency.	Sandy silt material with moderate drainage characteristics.	Silty clay material, very organic appearance, high water content and easily worked to plastic consistency.	Silty clay with high water content and easily worked to plastic consistency.
Observations		Firm to water supported. Distinct sediment horizon and favorable for dewatering.	Moderately firm, less organics, favorable for dewatering	Structureless with organics may be difficult to dewater.	Structureless with increasing clay content may be difficult to dewater

Sediment Characteristics

TS-038	TS-040	TS-041	TS-043
Intertidal – Dries with most tide cycles	Intertidal	Intertidal	Subtidal
Two unique sediment horizons.	Multiple sediment horizons. (4 or more)	Multiple sediment horizons. (3 or more)	Two horizons, grading to firm with shells.
Silts & Fines to 1.0 feet. More firm below 1.0 ft.	Sands, silts and fines depositional horizons.	Mixed horizons with bricks, debris and wood.	Silt & clay to 1.0 feet. Unique shells below 3 feet.
No observed oils.	Intermittent petroleum odors.	Petroleum odors in all samples and distinct sheen on some.	No observed odors.
No distinct biota	No distinct biota	No distinct biota.	Biologic active zone at 0 to 1.5 feet.

Bulk Sediment Analysis

Table 3
Homogenized RAW Sediment Samples

Analytical Parameter	Unit of Measure	TS-038	TS-040	TS-041	TS-043
TPH-DRO (C10-C44)	mg/kg	**937**	**536**	**959**	**343**
Pesticides via SW846 8081B					
Aldrin, Chlordane, Dieldrin	ug/kg	ND	ND	ND	ND
Total DDD	ug/kg	ND	ND	ND	ND
Total DDE	ug/kg	ND	ND	ND	ND
Total DDT	ug/kg	ND	**161**	ND	ND
Other Pesticides	ug/kg	ND	ND	ND	ND
PCBs via SW846 8082A					
Other PCBs- 1016, 1221, 1232, 1242, 1262, 1268	ug/kg	ND	ND	ND	ND
Aroclor 1248	ug/kg	**10100**	ND (17)	ND (22)	ND (23)
Aroclor 1254	ug/kg	**11300**	**5580**	**5710**	**223**
Aroclor 1260	ug/kg	**2820**	**1550**	**3310**	**251**
Total Target PCBs	ug/kg	**24,220**	**7,130**	**9,020**	**474**

DRET Evaluation

- Dredge Elutriate Test Procedure
  - Simulate active dredge operations
  - Indicate the potential water quality during dredging operations
  - Indicate the potential for sediment resuspension
- DRET Procedure
  - 4 sediment samples were tested
  - Slurry was created - 10 grams sediment to 1 liter surface water
  - Mechanical mixing-then 1-hour aeration-then 1-hour settling
  - Lab analysis TSS at 5 min, 10 min and 60 min
  - Elutriate analysis at 60 min
  - Total and dissolved (via centrifuge) lab analysis

TSS Evaluation
Very similar results

Name/ Sample Time	TS-038 (mg/l)	TS-040 (mg/l)	TS-041 (mg/l)	TS-043 (mg/l)
TS-040 Static Surface Water Sample	20	20	20	20
5 minute settling	1,690	1,020	1,070	1,400
10 minute settling	1,470	572	1,120	1,140
60 minute settling	102	118	102	112

DRET – Total Water Samples

60-minutes DRET Samples					
Analytical Parameter	**Unit of Measure**	**TS-038 (Unfiltered)**	**TS-040 (Unfiltered)**	**TS-041 (Unfiltered)**	**TS-043 (Unfiltered)**
TPH-DRO (C10-C44)	mg/l	**0.51**	**0.527**	**0.444**	**ND**
Pesticides					
Aldrin, Chlordane, Dieldrin	ug/l	**0.12**	**0.039**	**0.051**	ND
Total DDD	ug/l	ND	ND	ND	ND
Total DDE	ug/l	ND	ND	ND	ND
Total DDT	ug/l	ND	ND	ND	**0.015**
Other Pesticides	ug/l	ND	ND	ND	ND
PCBs					
Other PCBs, 1016, 1221, 1232, 1242, 1262, 1268	ug/l	ND	ND	ND	ND
Aroclor 1248	ug/l	**2.3**	ND (0.16)	**1**	ND (0.17)
Aroclor 1254	ug/l	**2.3**	ND (0.24)	**0.97**	ND (0.17)
Aroclor 1260	ug/l	**1.5**	**0.69**	**0.81**	ND (0.25)
Total Target PCBs	ug/l	**6.1**	**0.69**	**2.78**	**ND**

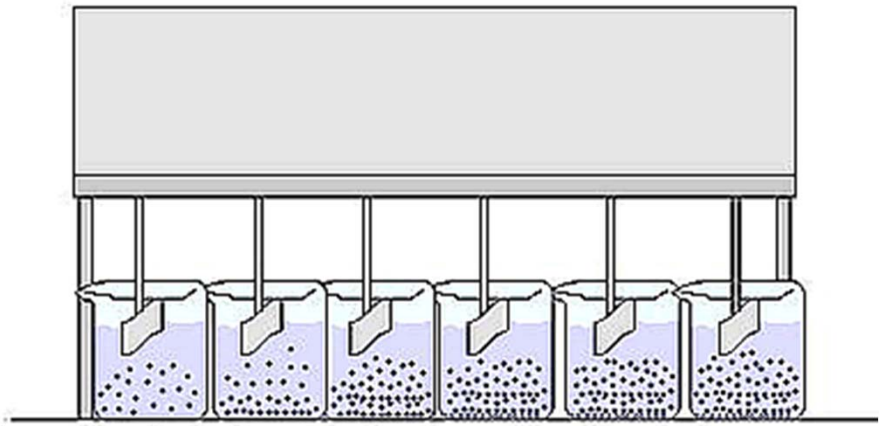
PARTICULATE vs. DISSOLVED SEDIMENT SUSPENSION

- "Total" chemical analysis and Dissolved-only chemical analysis demonstrates dominantly particle associated resuspension.
  - Metals — No dissolved metals detected
  - Pesticides — Dissolved dieldrin detected
  - PCB Congeners — Several Congeners in PPT levels
  - Targeted PCBs — No dissolved PCBs

✓ Chemical suspension and dispersion appears limited to suspended solids.

Chemical Addition Jar Tests

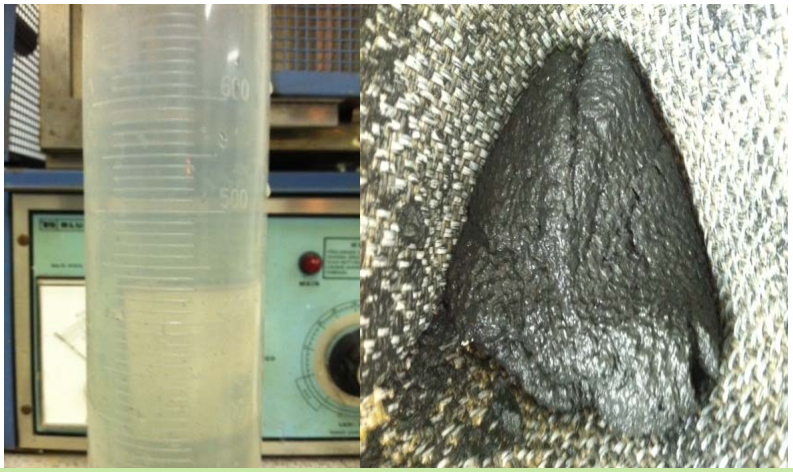
- Multiple Jar Tests were completed
  - Seven chemical additives
  - Multiple concentrations
  - Four sediment samples
- Identified favorable and consistent chemicals for further evaluation



Rapid Geotextile Screening

- 14 Geotextile Funnel Tests
- 4 baseline tests - untreated slurry
- 12 Lab Analysis of Solids Content
- 12 Bench Analysis of Turbidity

Poor results.
TS-038 –AQ 314 @ 70 ppm
70.45 FAU Turbidity



Favorable results.
TS-038 –AQ 587 @ 150 ppm
6.08 FAU Turbidity

Geotextile Summary

- Positive chemical addition tests
  - Inconsistent optimal chemical additive concentration due to physical and chemical variations
- Positive geotextile tests
  - Rapid rate of draining
  - Minimal potential for textile blinding

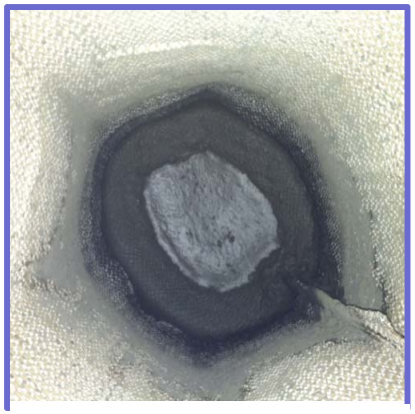
Hanging Geotextile Bag Tests

- Larger sediment slurry volume was tested
- Increased sediment concentration to evaluate textile blinding
  - 25% sediment and 75% water by volume
- Three unique tests
  - TS-038, TS-040 and TS-041

Hanging Bag Geotextile Tests

- Slurry is prepared and mixed thoroughly
- Slurry is aerated and rapidly added to suspended geotextile bags
- Elutriate is monitored, captured and analyzed

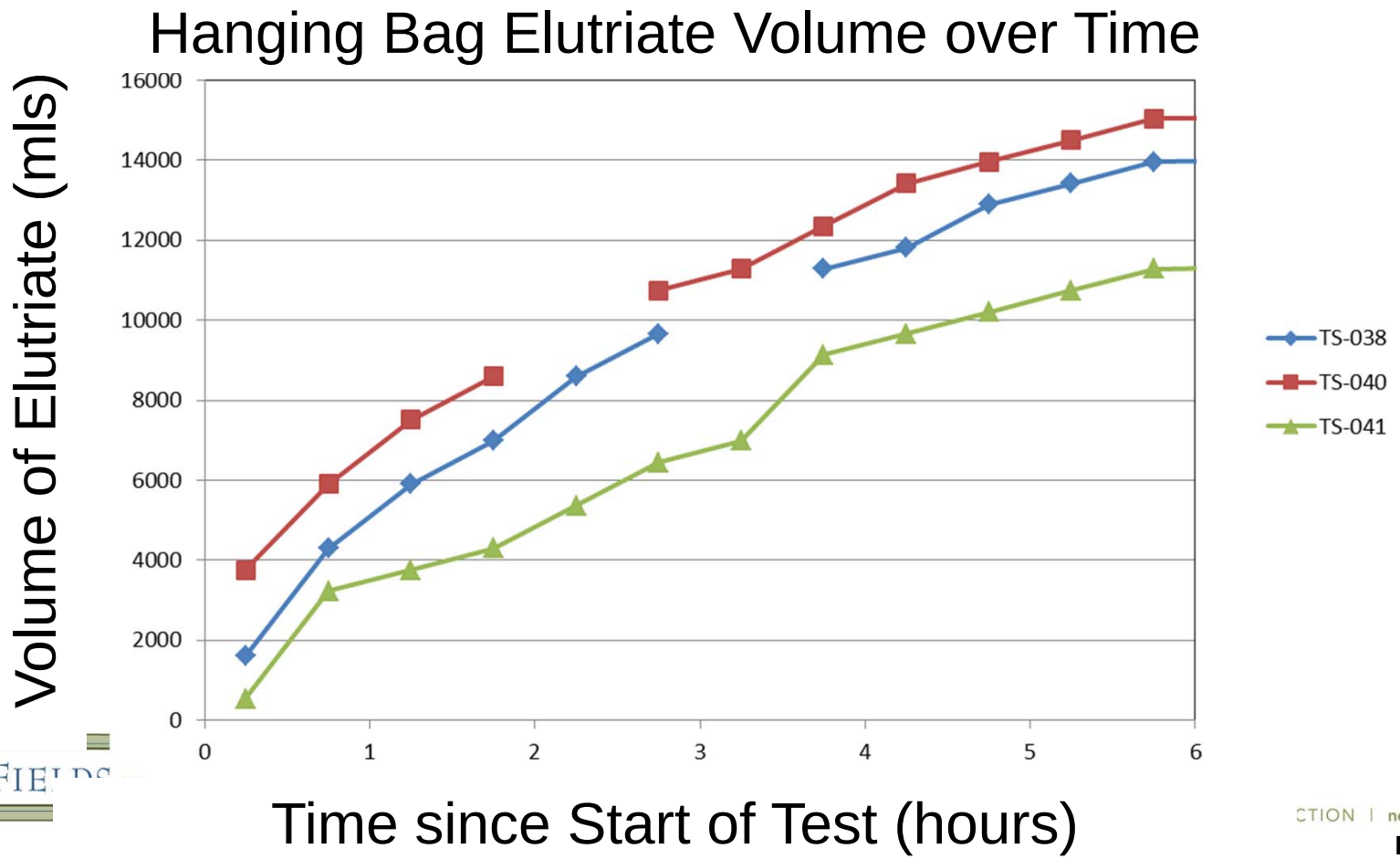
TS-038
5.75 Hours
~ 5 to 10 ml standing water



TS-038
70.75 Hours
"Powder dry" at surface

Elutriate Passing Geotube

- Slurry loading was relatively consistent considering the wide variation in soil texture
  - TS-040 greatest sand content @ > 60% sand
  - TS-041 greatest silt/clay content @ > 80% silt/clay



Geotube Sediment Variability

- TS-038 material was very favorable
  - Gravity dewatered all slurry water component within first 6 hours; i.e. added water was removed
  - “Powder Dry” sediment fraction at 70-hours
  - Plastic Limit decreased from 32% to 21% indicates physical stabilization of sediment
- TS-041 was less favorable
  - Standing water in geobag after 70-hours
  - Only by homogenizing the sediment did the material pass Paint Filter test. Indicates extended geotube dewatering time and increased sizing.
  - Plastic limit remained at 39%

Geotube Effluent Concentrations

Lab data indicates potential water quality

- TSS reduced to < 7 mg/l
- TPH reduced to < 0.5 mg/l
- Elevated dissolved solids including chlorides remained in Geotube efflutn
- Many compounds below detection limit
  - Total targeted PCBs
  - Dissolved targeted PCBs
  - Total Pesticides
  - Dissolved Pesticides
  - Dissolved lead detected in TS-038 only

Geotube Effluent Quality

Analytical Parameter	Unit of Measure	TS-038 (Unfiltered)	TS-040 (Unfiltered)	TS-041 (Unfiltered)
TPH-DRO (C10-C44)	**mg/l**	**0.448**	**0.389**	**ND**
Pesticides				
Aldrin, Chlordane, Dieldrin	ug/l	ND	ND	ND
Total DDD	ug/l	ND	ND	ND
Total DDE	ug/l	ND	ND	ND
Total DDT	ug/l	ND	ND	ND
Other Pesticides	ug/l	ND	ND	ND
PCBs				
Other PCBs, 1016, 1221, 1232, 1242, 1262, 1268	ug/l	ND	ND	ND
Aroclor 1248	ug/l	ND (0.15)	ND (0.15)	ND (0.17)
Aroclor 1254	ug/l	ND (0.15)	ND (0.15)	ND (0.16)
Aroclor 1260	ug/l	ND (0.22)	ND (0.22)	ND (0.24)
Total Target PCBs	ug/l	ND	ND	ND

Overall Geotube Evaluation

- Chemical additives improved water clarity
- Geotextiles effectively filtered a large fraction of fine and very fine material
- Blinding of geotextiles was not observed over 18 gravity drainage tests and 3 hanging bag tests
- Geotube alternative appears favorable
  - Very fine material around TS-041 is the most conservative design material

Plate and Frame Filter Press

- Three sediments were tested
  - TS-038, TS-040 and TS-041
- Two sediment slurries were evaluated
  - 12.5% sediment and 20% sediment by volume
- Test process was relatively fast
- Filter cloth was stable and easily worked
- Sludge was moderately firm with moderate adhesion and plastic feel

Plate and Frame Lab Delay

- Laboratory analysis of plate and frame samples have been delayed in QA/QC process

Summary

- Elevated compounds of concern were identified in the homogenized treatability samples
- The textural characteristics of the very shallow sediments are variable apparently due to depositional environment
- DRET analysis indicates a low to moderate potential for resuspension and chemical redistribution

Summary

- Chemical addition yielded favorable, but varied results associated with texture characteristics
- Sediment treatment using geotube technology appears favorable
  - For sediment dewatering and
  - For effluent water quality
- Sediment treatment using plate-and-frame technology appears favorable